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## (54) SAFETY SYRINGE

SICHERHEITSSPRITZE

SERINGUE DE SECURITE

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(56) References cited:
**EP-A- 0 557 511**
**WO-A-93/10842**
**WO-A-94/05356**
**WO-A-97/10867**
**US-A- 5 152 750**
**US-A- 5 405 327**
**US-A- 5 569 203**



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## Description

**[0001]** The present invention concerns safety syringes for medical uses which permit the limitation and if possible the avoidance of injury to healthcare workers. The aim of these safety syringes is evidently to avoid risk of contamination during handling of the syringe and to prevent the needle, after administering an injection into a patient suffering from an illness such as viral hepatatis or AIDS, from injuring the nurse before the needle has been safely protected.

**[0002]** Such safety syringes are known in documents WO 90/06148, EP 0.326.983, EP 0.347.742, US 4.507.117 or US 4.675.005. All of the syringes described in these documents necessitate the retracting of the needle into the syringe barrel after use, but by complicated manipulations involving rotary movements, coupling by bayonet etc. which are impractical movements which hospital personnel are not used to carrying out and which require the use of two hands, one of which can approach the sharp tip of an infected needle.

**[0003]** A safety syringe according to the preamble of claim 1 is known from document WO-A-94/05356.

**[0004]** The aim of the present invention is to create a safety syringe for medical use permitting the needle to be retracted inside the cylinder after use but which can be utilized in the same way as all standard syringes for its preparation and use, that is to say fixing the required needle, filling, changing needle if necessary, coupling onto an air filter if necessary, evacuation of air-bubbles and injection. Nevertheless, the difference and the advantage compared to standard syringes is that the operator's hands cannot approach the dangerous distal zone of the syringe which is a source of injury because it is obligatory that the active hand which pulls the piston is occupied at the proximal extremity of the syringe.

**[0005]** Another aim of the invention is to prevent the user to try to re-cap the infected needle or to have to dispose of this needle in a specialized disposal box which is not always handy. Yet another aim is to facilitate the reading of the volume of liquid introduced through the needle.

**[0006]** Another aim of the present invention is the creation of a purely mechanical syringe having a small number of parts, easy to manufacture and at low cost compared to other known safety syringes, and with a cost comparable to existing low-cost standard single-use syringes.

**[0007]** Another aim of the present invention is the creation of a safety syringe which allows the user, before employing the syringe, to choose the appropriate standard needle and to fix it onto the syringe the same as with low-cost conventional single use syringes, which is often not possible with safety syringes.

**[0008]** The objective of the present invention is a safety syringe which avoids the disadvantages of existing syringes permitting the above mentioned aims to be reached, comprising a barrel, a plunger which can be moved linearly and remain watertight and a needle carrier similarly movable linearly inside the barrel and which distinguishes itself by the characteristics listed in Claim 1.

**[0009]** The annexed drawings show schematically and as an example a form of execution and variant of the safety syringes according to the invention.

Fig. 1 illustrates a longitidunal section of the syringe according to the invention in it's position before use, during storage.

Fig. 2 illustrates a longitudinal section of a standard needle in its protection cap, intended to be fixed onto the distal end of the needle carrier by push-fit.

Fig. 3 illustrates the coupling of the needle carrier onto the plunger.

Fig. 4 illustrates a longitudinal section of the syringe at the end of its stroke, the cursor having been slid back to allow the needle carrier to be retracted with its needle inside the cylinder.

Fig. 5 illustrates the needle carrier and its needle retracted inside the barrel.

Fig. 6 illustrates a variant of the distal extremity of the syringe, particularly of the plunger, rendering the syringe automatically non-reusable after a single use.

**[0010]** The safety syringe illustrated particularly in Fig.1 constitutes a barrel 1 moulded by injection of, for example, transparent polypropylene. This barrel 1 has a length and a diameter which depend on the capacity of the syringe, of its ease of use and other normal features such as the length of the standard needles.

**[0011]** This barrel 1 of the syringe has at it's proximal extremity a flange 2 moulded integrally with the barrel, but of a larger diameter or having a lengthened shape in plan view.

**[0012]** The syringe consists further of a plunger having a shaft 3 of which the proximal extremity which emerges out of the barrel 1 has a push-button. The plunger head 4 situated at the distal extremity of shaft 3 includes a housing 5 to hold an O-ring 6 which slides in a watertight fashion within the barrel 1.

**[0013]** The use of an O-ring to ensure the watertightness between the plunger and the barrel is advantageous because this type of joint costs less than a full piston head moulded in rubber; furthermore it can be injection moulded in a synthetic elastomer which meets all medical requirements.

**[0014]** The distal extremity of the shaft 3 situated beyond the O-ring 6 of the plunger in the direction of the distal extremity of barrel 1 consists of the male organs 8 of a coupling system of the plunger 3-6 with a needle carrier 7. These male coupling organs are formed by projections 8 extending axially in the direction of the distal extremity of the barrel 1, these projections 8 being situated around a circumference centred on the axis of barrel 1 and of which the radial extension is in the order

of 40° to 120° according to the number of the projections 8. Generally one uses three or four projections 8 uniformly distributed around the axis of plunger 3-6 and presenting an angular spread included between 45° and 70°. Each of the projections 8 has at its tip an inclined plane 9 on its external face widening in the direction of the proximal extremity of barrel 1 and forming a retaining ridge 10 on the cylindrical face of the proximal extremity of projection 8. The distal part 11 of barrel 1 presents a smaller diameter extension with an annular internal stop 12 at its distal extremity formed by a circular brim facing towards the axis of barrel 1 so as to reduce the distal opening of barrel 1. This distal part 11 of the barrel has an annular groove 11a situated on its external peripheral surface.

**[0015]** The syringe also includes a needle carrier 7 comprising a distal end consisting of a hollow cone 13 designed to hold an hypodermic needle 14 by push-fit. The proximal end 15 of the needle carrier comprises a cylindrical portion 16 having an external diameter which corresponds of the internal diameter of the distal extension 11 of barrel 1. This proximal extremity 16 of the needle-carrier 7 slides in a watertight manner inside the distal part of the barrel.

**[0016]** A seal, for example an O-ring, 16a lodged in an annular channel around the needle-carrier ensures a perfectly watertight fit between the barrel 1 and the needle-carrier 7. It is possible to retract the needle-carrier into barrel 1 when it has been freed by sliding the cursor 21, 22. The external diameter of the distal part of needle-carrier 7 does not exceed the diameter of the distal opening of barrel 1.

**[0017]** The median section 17 of this needle-carrier presents a diameter which corresponds to the internal diameter of the brim situated at the distal extremity 11 of the barrel. Thus the furthest distal position of the needle-carrier 7 in the barrel 1 is defined by the contact of the shoulder separating the proximal part 16 of the median section 17 of the needle-carrier 7 with the stop 12 of barrel 1.

**[0018]** This median section 17 of needle-carrier 7 has a circular groove 18 with a proximal annular face situated, when the needle-carrier 7 is in it's furthest distal position, in the extension of the frontal face of the rim of the distal extremity 11 of barrel 1.

**[0019]** In the standby or storage position of the syringe illustrated in figure 1, the needle-carrier 7 is lodged in the distal part 11 of barrel 1.

**[0020]** On part of its internal circumference, about 60° to 120°, the proximal portion 16 of the needle-carrier 7 includes a ridge or catch 19 which constitutes the female part of the coupling of the plunger into the needle-carrier intended to cooperate, as we shall see later, with the catch 10 of the tip of at least one of the fingers 8 of the plunger.

**[0021]** The coupling comprised by the catches 10 of one or two fingers 8 and the catch 19 of the needle-carrier 7 is unlockable. It thus possible to re-lock together the plunger and the needle-carrier after these have already been locked together once, and the needle can then still be pulled inside the barrel 1 after use as soon as the user has slid back the cursor 22 and thus freed the needle-carrier 7.

**[0022]** In its initial position during storage (figure 1) an operator can push-fit a needle 14 onto the distal projection 13 of the needle-carrier 7 and also change the needle as required, in the same way as is done with convential syringes. The needle carrier 7 is locked in this position in relation to the barrel 1 by a cursor. This cursor consists of a ring 21-22 sliding freely around the barrel. This ring 21 has at least one flexible locking finger 22 extending in the direction of the distal tip of the barrel 1. In its operational position (figure 1), the cursor is in its distal position and the ends of its fingers 22 are lodged in groove 18 of the needle-carrier 7. Thus the needle-carrier 7 is locked in its service position and cannot be pushed into the barrel for example during needle fixing, aspiring a liquid from a bottle or administering an injection.

**[0023]** This cursor is transparent and in no way interferes with visibility when filling the syringe.

**[0024]** The operator can then carry out all necessary clinical requirements; aspire a liquid and inject it into a patient, or sample blood from a patient's vein and empty it into a test tube using traditional manipulations.

**[0025]** When the operator has finished and wishes to dispose of the syringe, the operator must never cap the needle nor discard the naked needle, which always presents a great potential danger of needlestick injury, but at the end of the injection stroke a slightly firmer pressure is applied to the plunger thus causing the coupling together of the plunger and the needle-carrier, the catch 10 of fingers 8 locking by elastic deformation of the fingers 8 onto the catch 19 of the needle-carrier 7 as shown in figure 4.

**[0026]** As long as the cursor 21-22 remains in its distal service position, the plunger 4 can still be unlocked from the needle-carrier 7. This is important because this coupling at the end of the distal stroke of the plunger can sometimes happen unintentionally.

**[0027]** Before pulling the needle-carrier 7 inside the barrel 1 by means of the plunger, the user must unlock the needle-carrier 7 by sliding the cursor 21-22 in a proximal direction along barrel 1 which pulls the fingers 22 out of the groove 18 of the needle-carrier 7, which fingers 22 can then be parked in the annular external depression 11a around the barrel.

**[0028]** From this moment, the plunger and the needle-carrier are coupled together and, after having slid back the cursor 21-22 to free the needle-carrier, in withdrawing the plunger one withdraws the needle-carrier 7 and its needle 14 inside the barrel 1 (figure 5).

**[0029]** Because of the flexibility of the fingers 8 and that only one or two of these are coupled with catch 19 of the needle carrier 7, this latter is inclined in relation to the axis of the barrel (figure 5) so that when the plung-

er has been sufficiently retracted, the needle can no longer emerge from the barrel.

**[0030]** The proximal extremity of the barrel 1 contains an internal stop ring 23 with an inclined ramp which allows the plunger to be inserted into the barrel 1 but which stop ring blocks it's being pulled out. Thus, the operator cannot pull the needle out of the barrel through it's proximal opening and the used needle is irrevocably interred inside the barrel 1. This stop ring is considerably more prominent than the stop rings normally included in standard syringes where the plunger can easily be removed from the barrel through it's proximal opening.

**[0031]** In a variant, the plunger shaft can have a Y-section instead of an X-section. This can provide an economy of around 25% of plastic used for this part while still providing it with sufficient rigidity. By this means the manufacturing cost of these syringes can be reduced.

**[0032]** The principal advantages of this safety syringe are:

1. It will eliminate any possibility for healthcare personnel to suffer accidental needlestick injury with an infected needle, after having administered an injection.

2. It's mode of use (filling/injection) remains exactly the same as the existing procedure for use with standard syringes.

3. To render it totally non-reusable, it is merely necessary to push the plunger to the limit of it's stroke, which couples the distal tip of the plunger into the needle carrier. The needle is then withdrawn by the plunger, after the cursor has been slid back, inside the barrel where it is blocked.

4. The needle having by these actions been inclined and pressed against the interior of the barrel, it cannot by any means re-emerge through the distal opening of the barrel. Because of the stop ring 23, it furthermore cannot be pulled out of the barrel through the proximal opening.

5. During the push-fitting of a needle onto the needle carrier and during the entire cycle of use of the syringe, it is impossible to push the needle carrier inside the the barrel, as it is locked by the cursor 21,22.

6. On the other hand, the coupling with the needle carrier by the plunger (see 3 above) presents no difficulty.

7. The syringe cannot be reused and can be discarded for incineration without the slightest danger.

8. Neither hand can approach the dangerous distal zone which can cause needlestick accidents. One hand is holding the syringe by it's barrel while the other hand is pulling the plunger.

9. It consists of four moulded plastic components, plus two standard elastomeric seals.

10. It accepts all standard needles and all volumes of the syringe incorporate the same sized needle carrier.

11. The manufacturing costs are comparable to those of a standard non-safety single use syringe.

12.The dead volume at the end of an injection is within the ISO international standards.

**[0033]** Figure 6 illustres a form of execution of the syringe which is self-destructing, in other words once it has been used it can no longer be used, even intentionally.

**[0034]** To realise this, the distal tip of the plunger shaft has a passage 30 connecting the spaces on barrel 1 situated each side of the watertight seal 6 of the plunger.

**[0035]** This passage 30 is blocked and rendered watertight by a blocking means, for example a ball 31, preferably elastomeric, held in position by an element 32 lodged and held between the fingers 8 which carry internal rims 33 for this purpose. This element 32 has the characteristic of having a variable resistance to compression depending on whether it is dry or wet. In it's dry state it is hard and presses the ball 31 strongly against it's seating, thus blocking the passage 30.

**[0036]** As soon as the syringe has been filled with the liquid the element 32 has it's mechanical resistance diminished. Thus, while the user empties the liquid contained in the syringe, ball 31 is constantly pressed against it's seating, the pressure applying in the distal chamber of barrel 1 being greater than that applying in the proximal chamber of said barrel.

**[0037]** On the other hand, if the user wishes to refill the syringe he must, to aspire the liquid through the needle, pull back the plunger which causes a depression in the distal chamber of the barrel. At this moment, ball 31 moves by deforming element 32 which is now soft and it is air that fills the distal chamber of the barrel, which is now unable to be filled with a liquid.

**[0038]** It is evident that in this second form of execution the user can equally well push the plunger to the limit of it's stroke in the barrel and to definitely couple this to the needle-carrier then pull the needle-carrier and the needle it is carrying inside the barrel so as to then discard the syringe in perfect safety.

**[0039]** Thus, this variant, in addition to the advantages of the first version of the syringe that has been described, is self-destructing; it cannot be re-used, even intentionally.

**[0040]** In another variant and with the aim of reducing even more the amount of plastic required for manufac-

ture of the syringe, it is possible to mould the finger-grip flange 2, not at the proximal extremity of the barrel 1 but at a distance of 1 to 2 cm from this proximal extremity of the barrel. In so doing, it is thus possible to shorten the length of the plunger shaft 3, advancing the position of it's push-button to abut, when the plunger head 4 has been pushed to the limit of it's stroke inside the barrel, against the opening of the barrel at it's proximal extremity, without affecting the ease of manipulation of the plunger.

## Claims

1. A safety syringe for medical use comprising a barrel (1), a needle-carrier (7) sliding in a watertight fashion in the distal part of the barrel (1) and a plunger (3,4) sliding in a watertight fashion in the proximal part of the barrel (1) ; the plunger (3,4) and the needle-carrier (7) each comprising a coupling organ interconnecting by a simple axial push on the plunger (3,4) to enable the needle-carrier (7) with its needle to be withdrawn inside the barrel (1) at the end of the injection ; the distal part of the barrel (1) having an internal annular stop (12) which prevents the needle-carrier (7) from being pulled or pushed out of the barrel (1) through its distal opening; the central part (17) of the needle-carrier (7) having an external diameter greater than the internal diameter of the annular stop (12) while the proximal part (15) of the needle-carrier (7) has a diameter corresponding to the internal diameter of the distal part (11) of the barrel (1); means (21,22) being provided to temporarily prevent the needle-carrier (7) from being pushed inside the barrel (1) due to an axial pressure applied to the distal end of the needle-carrier (7), **characterized by** the fact that said means (21,22) are manually operable to lock and unlock the needle-carrier (7) and consist of a cursor formed by a ring (21) sliding freely around the barrel and having at least one flexible locking finger (22) of which the tip is lodged, when in its forward locking position, in a groove (18) of the needle-carrier (7).

2. A syringe according to claim 1, **characterised by** the fact that the barrel (1) has an annular groove (11a) around its distal part (11) for the purpose of parking the fingers (22) of the cursor when this is in its slid-back position to free the needle-carrier (7).

3. A syringe according to claim 1, **characterised by** the fact that the coupling organ incorporated in the needle-carrier (7) which couples the plunger (3,4) to the needle-carrier (7) is formed by a rim or catch (19) covering one part only of the tronconical internal surface of the proximal part (15) of the needle-carrier (7) while the member of the plunger (3,4) which couples the plunger (3,4) to the needle-carrier (7) consists of at least three fingers (8) fixed to the shaft (3) of the plunger (3,4) advancing axially in the direction of the distal extremity of the barrel, the ends of these fingers (8) having an external conical surface (9) and a hooking catch (10) designed to cooperate with the conical wall of the needle-carrier (7) and the catch (19) of the latter by elastic deformation of said fingers (8) upon pushing the plunger (3,4) against the needle-carrier (7).

4. A syringe according to claim 3, **characterised by** the fact that the catch (19) of the coupling of the plunger (3,4) and the needle-carrier (7) does not occupy the entire periphery of the internal conical surface of the proximal part (15) of the needle-carrier (7) so that due to the elasticity of the fingers (8) of the plunger (3,4) the needle-carrier is taken up an oblique position, inclined in relation to the axis of the syringe when it is withdrawn inside the barrel.

5. A syringe according to claim 4, **characterised by** the fact that the distal extremity (11) of the barrel (1) is formed by a rim (12) in the direction of the axis of the syringe which reduces the diameter of the distal opening of the barrel.

6. A syringe according to one of the preceding claims, **characterised by** the fact that the plunger comprises a head (4) provided with a groove (5) in which a seal (6) is positioned sliding in a watertight fashion against the inner wall of the barrel (1).

7. A syringe according to one of the preceding claims, **characterised by** the fact that towards the proximal extremity of the barrel a stop (23) is formed by an internal annular projection of the barrel wall, this projection presenting a conical part decreasing in the direction of the proximal end of the barrel and an annular face in the direction of the distal part of the barrel, preventing the plunger from being withdrawn from the barrel through its proximal opening.

8. A syringe according to one of the preceding claims, **characterised by** the fact that said annular groove (18) is formed in the central part (17) of the needle-carrier (7) and comprises a lateral proximal face which is situated when in active use in the continuation of the distal face of the barrel.

9. A syringe according to one of the preceding claims, **characterised by** the fact that the external surface of the proximal part of the needle-carrier has a circular seal (16a).

10. A syringe according to one of the preceding claims, **characterised by** the fact that the shaft section (3) of the plunger has a general shape of a Y.

11. A syringe according to one of the preceding claims, **characterised by** the fact that the distal tip of the plunger has a passage (30) connecting the distal and proximal chambers of the barrel (1) separated by this plunger (3,4) ; by the fact that a means (31) of blocking this passage (30) is held in a position blocking said passage (30) by an element of variable resistance (32) held between the fingers (8) ; and by the fact that this element (32) has a mechanical resistance which is lower when wet than when dry.

12. A syringe according to one of the preceding claims, **characterised by** the fact that the finger-grip collar (2) is positioned at a distance inferior to 2 cm from the proximal extremity of the barrel (1).

13. A syringe according to one of the preceding claims, **characterised by** the fact that the coupling of the plunger into the needle-carrier is unlockable by a simple axial pulling.

**Patentansprüche**

1. Sicherheitsspritze zur medizinischen Verwendung mit einem Rohr (1), einem Spritzenansatz (7), der wasserdicht im unteren Teil des Rohres (1) gleitet, und einem Kolben (3, 4), der wasserdicht im oberen Teil des Rohres (1) gleitet; wobei der Kolben (3, 4) und der Spritzenansatz (7) je ein Kupplungsorgan besitzen, das durch einen einfachen Axialdruck auf den Kolben (3, 4) koppelt, wodurch der Spritzenansatz (7) mit seiner Nadel in die Lage versetzt wird, am Ende des Einspritzens in das Rohr (1) zurückgezogen zu werden; der untere Teil des Rohres (1) einen inneren ringförmigen Anschlag (12) besitzt, der es verhindert, dass der Spritzenansatz (7) durch die untere Öffnung des Rohres (1) aus diesem herausgezogen oder herausgedrückt wird; der mittlere Teil (17) des Spritzenansatzes (7) einen Aussendurchmesser hat, der grösser als der Innendurchmesser des ringförmigen Anschlags (12) ist, während der obere Teil (15) des Spritzenansatzes (7) einen Durchmesser hat, der dem Innendurchmesser des unteren Teils (11) des Rohres (1) entspricht; und Mittel (21, 22) vorgesehen sind, um vorübergehend zu verhindern, dass der Spritzenansatz (7) durch einen auf das untere Ende des Spritzenansatzes (7) ausgeübten Axialdruck in das Rohr (1) hineingedrückt wird; **dadurch gekennzeichnet, dass** diese Mittel (21, 22) von Hand bedienbar sind, um den Spritzenansatz (7) zu verriegeln und zu entriegeln, und aus einem Reiter bestehen, der aus einem Ring (21) gebildet wird, der frei um das Rohr gleitet und zumindest einen biegsamen Verriegelungsfinger (22) besitzt, dessen Spitze in seiner vorderen Verriegelungsstellung in einer Nut (18) des Spritzenansatzes (7) ruht.

2. Spritze nach Anspruch 1, **dadurch gekennzeichnet, dass** das Rohr (1) eine Ringnut (11a) um seinen unteren Teil (11) besitzt, die dazu dient, die Finger (22) des Reiters in eine Parkposition zu bringen, wenn dieser Reiter sich in seiner zurückgeschobenen Stellung befindet, um den Spritzenansatz (7) freizugeben.

3. Spritze nach Anspruch 1, **dadurch gekennzeichnet, dass** das in den Spritzenansatz (7) eingebaute Kupplungsorgan, das den Kolben (3, 4) an den Spritzenansatz (7) ankoppelt, aus einer Kante oder Sperre (19) gebildet wird, die nur einen Teil der kegelstumpfartigen Innenseite des oberen Teils (15) des Spritzenansatzes (7) einnimmt, während das Glied des Kolbens (3, 4), das den Kolben (3, 4) an den Spritzenansatz (7) ankoppelt, aus mindestens drei Fingern (8) besteht, die am Schaft (3) des Kolbens (3, 4) befestigt sind und sich axial in Richtung auf das untere Ende des Rohres erstrecken, wobei die Enden dieser Finger (8) eine kegelförmige Aussenseite (9) und einen Sperrhaken (10) besitzen, der so ausgelegt ist, dass er mit der kegelförmigen Wandung des Spritzenansatzes (7) und dessen Sperrklinke (19) zusammenwirkt, indem diese Finger (8) sich elastisch verformen, wenn der Kolben (3, 4) gegen den Spritzenansatz (7) gedrückt wird.

4. Spritze nach Anspruch 3, **dadurch gekennzeichnet, dass** die Sperrklinke (19) der Kupplung des Kolbens (3, 4) und des Spritzenansatzes (7) nicht den gesamten Umfang der kegelförmigen Innenseite des oberen Teils (15) des Spritzenansatzes (7) einnimmt, so dass infolge der Nachgiebigkeit der Finger (8) des Kolbens (3, 4) der Spritzenansatz sich schräg zur Spritzenachse legt, wenn er in das Rohr zurückgezogen wird.

5. Spritze nach Anspruch 4, **dadurch gekennzeichnet, dass** das untere Ende (11) des Rohres (1) durch eine Kante (12) gebildet wird, die zur Spritzenachse hin gerichtet ist und den Durchmesser der unteren Öffnung des Rohres verringert.

6. Spritze nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** der Kolben ein Kopfstück (4) besitzt, das mit einer Nut (5) versehen ist, in der eine Dichtung (6) liegt, die wasserdicht an der Innenwand des Rohres (1) gleitet.

7. Spritze nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** in Richtung auf das obere Ende des Rohres durch einen ringförmigen inneren Vorsprung der Rohrwandung ein Anschlag (23) gebildet wird, wobei dieser Vorsprung einen kegelförmigen Teil aufweist, der sich in Rich-

tung auf das obere Rohrende verjüngt, sowie eine ringförmige Stirnfläche in Richtung auf den unteren Rohrabschnitt, die den Kolben daran hindert, durch die obere Öffnung des Rohres aus diesem herausgezogen zu werden.

8. Spritze nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** diese Ringnut (18) im mittleren Teil (17) des Spritzenansatzes (7) ausgebildet ist und eine Oberseite besitzt, die beim aktiven Einsatz in der Fortsetzung der Unterseite des Rohres liegt.

9. Spritze nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die Aussenseite des oberen Teils des Spritzenansatzes eine Ringdichtung (16a) besitzt.

10. Spritze nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** der Querschnitt des Schaftes (3) des Kolbens allgemein Y-förmig ist.

11. Spritze nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** das untere Ende des Kolbens einen Durchgang (30) besitzt, der die untere und obere Kammer des Rohres (1) verbindet, die durch diesen Kolben (3, 4) getrennt sind; dadurch, dass ein Organ (31) zum Versperren dieses Durchgangs (30) in einer Stellung gehalten wird, in der es diesen Durchgang (30) durch ein zwischen den Fingern (8) gehaltenes Element variablen Widerstandes (32) versperrt; und dadurch, dass dieses Element (32) nass einen kleineren mechanischen Widerstand als trocken besitzt.

12. Spritze nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** der Fingerhaltering (2) weniger als 2 cm vom oberen Ende des Rohres (1) angebracht ist.

13. Spritze nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die Kupplung des Kolbens mit dem Spritzenansatz durch einfachen Axialzug lösbar ist.

## Revendications

1. Seringue de sécurité à usage médical comprenant un cylindre (1), un porte-aiguille (7) coulissant de façon étanche dans la partie distale de ce cylindre (1) et un piston (3,4) coulissant de façon étanche dans la partie proximale du cylindre (1); le piston (3,4) et le porte-aiguille (7) comprenant chacun un organe d'accouplement s'accouplant par une simple pression axiale du piston (3,4) pour permettre le retrait du porte-aiguille (7) avec son aiguille à l'intérieur du cylindre (1) à la fin d'une injection; la partie distale du cylindre (1) comprenant une butée interne annulaire (12) qui empêche le porte-aiguille (7) d'être retiré hors du cylindre ou poussé à l'intérieur du cylindre (1) au travers de son ouverture distale; la partie centrale (17) du porte-aiguille (7) présentant un diamètre externe plus grand que le diamètre interne de cette butée annulaire (12), tandis que la partie proximale (15) du porte-aiguille (7) présente un diamètre correspondant au diamètre interne de la partie distale (11) du cylindre (1); des moyens (21,22) étant prévus pour éviter temporairement que le porte-aiguille (7) soit poussé à l'intérieur du cylindre (1) par une pression axiale appliquée à l'extrémité distale du porte-aiguille (7), **caractérisée par le fait que** ces moyens (21, 22) peuvent être actionnés manuellement pour bloquer et débloquer le porte-aiguille (7) et consistent en un curseur formé par une bague (21) coulissant librement autour du cylindre et ayant au moins un doigt de verrouillage flexible (22) dont l'extrémité est disposée, lorsqu'elle est en position avancée de blocage, dans une gorge (18) du porte-aiguille (7).

2. Seringue selon la revendication 1, **caractérisée par le fait que** le cylindre (1) comporte une gorge annulaire (11a) autour de sa partie distale (11) pour recevoir les doigts (22) du curseur lorsque celui-ci est en position arrière pour libérer le porte-aiguille (7).

3. Seringue selon la revendication 1, **caractérisée par le fait que** l'organe d'accouplement incorporé dans le porte-aiguille (7) qui accouple le piston (3,4) au porte-aiguille (7) est formé par un rebord ou crochet (19) recouvrant une partie seulement de la surface interne tronconique de la partie proximale (15) du porte-aiguille (7) lorsque l'organe du piston (3,4) qui accouple le piston (3,4) au porte-aiguille (7) consiste en au moins 3 doigts (8) fixés à la tige (3) du piston (3,4) s'étendant axialement en direct de l'extrémité distale du cylindre, les extrémités de ces doigts (8) ayant une surface extérieure conique (9) et un crochet (10) destinés à coopérer avec la paroi conique du porte-aiguille (7) et du crochet (19) de celui-ci par une déformation élastique de ces doigts (8) suite à une pression du piston (3,4) contre le porte-aiguille (7).

4. Seringue selon la revendication 3, **caractérisée par le fait que** le crochet (19) de l'accouplement entre le piston (3,4) et le porte-aiguille (7) n'occupe pas la totalité de la périphérie de la surface conique interne de la partie proximale (15) du porte-aiguille (7) de sorte que du fait de l'élasticité des doigts (8) du piston (3,4) le porte-aiguille est déplacé d'une position oblique, inclinée par rapport à l'axe de la seringue lorsqu'elle est retirée à l'intérieur du cylin-

dre.

5. Seringue selon la revendication 4, **caractérisée par le fait que** l'extrémité distale (11) du cylindre (1) est constituée par un rebord (12) en direction de l'axe de la seringue réduisant le diamètre de l'ouverture distale du cylindre.

6. Seringue selon l'une des revendications précédentes, **caractérisée par le fait que** le piston comprend une tête (4) munie d'une gorge (5) dans laquelle un joint (6) est positionné coulissant de façon étanche contre la paroi interne du cylindre (1).

7. Seringue selon l'une des revendications précédentes, **caractérisée par le fait qu'**en direction de l'extrémité proximale du cylindre un arrêt (23) est formé par une projection annulaire interne de la paroi du cylindre, cette projection présentant une partie conique décroissant en direction de l'extrémité proximale du cylindre et une face annulaire en direction de la partie distale du cylindre, évitant que le piston ne soit extrait hors du cylindre à travers son ouverture proximale.

8. Seringue selon l'une des revendications précédentes, **caractérisée par le fait que** cette gorge annulaire (18) est formée dans la partie centrale (17) du porte-aiguille (7) et comporte une face proximale latérale qui est située en position active dans la continuation de la face distale du cylindre.

9. Seringue selon l'une des revendications précédentes, **caractérisée par le fait que** la surface externe de la partie proximale du porte-aiguille comporte un joint circulaire (16a).

10. Seringue selon l'une des revendications précédentes, **caractérisée par le fait que** la tige (3) du piston présente la forme générale d'un Y.

11. Seringue selon l'une des revendications précédentes, **caractérisée par** que le fait que la pointe distale du piston comporte un passage (30) reliant les chambres distale et proximale du cylindre (1) séparées par un piston (3,4); par le fait que des moyens (31) de blocage de ce passage (30) sont maintenus dans une position bloquant ce passage (30) à l'aide d'un élément à résistance variable (32) maintenu entre les doigts (8), et par le fait que cet élément (32) présente une résistance mécanique variable qui est plus faible lorsqu'il est mouillé que lorsqu'il est sec.

12. Seringue selon l'une des revendications précédentes, **caractérisée par le fait que** le collier de préhension (2) est positionné à une distance inférieure à 2 cm de l'extrémité proximale du cylindre (1).

13. Seringue selon l'une des revendications précédentes, **caractérisée par le fait que** l'accouplement du piston au porte-aiguille ne peut pas être désaccouplé par une simple traction axiale.

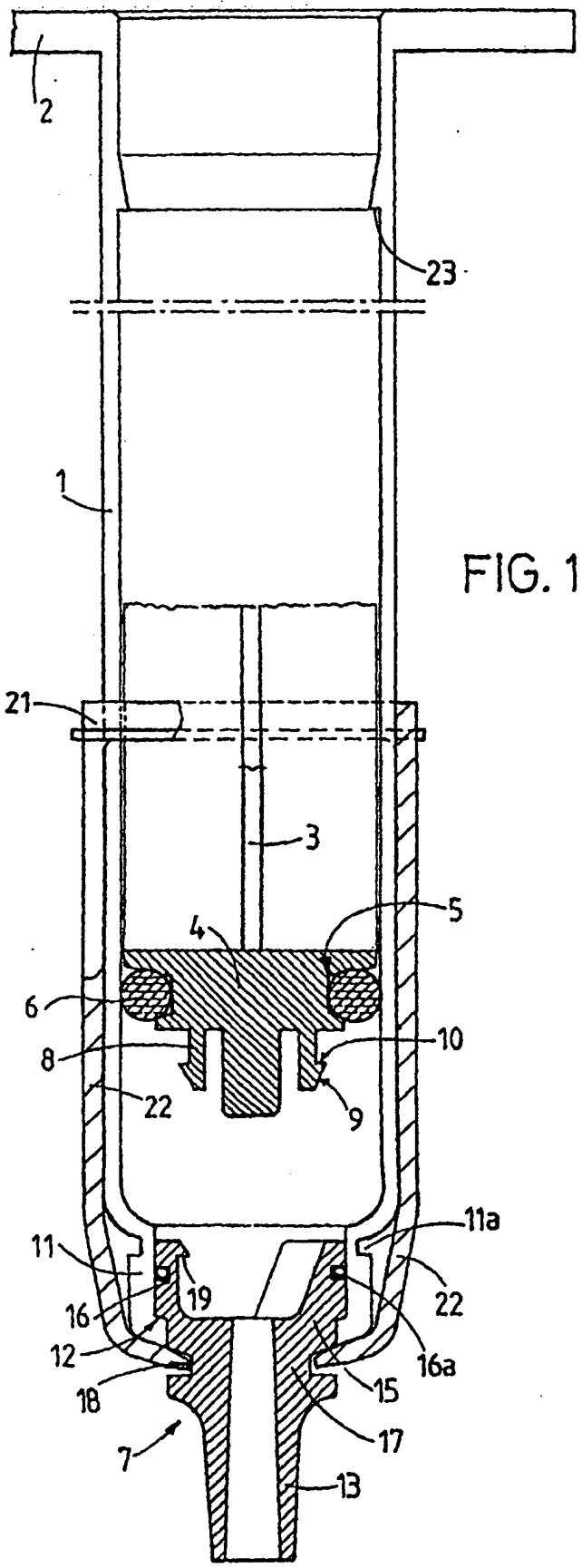



FIG. 1

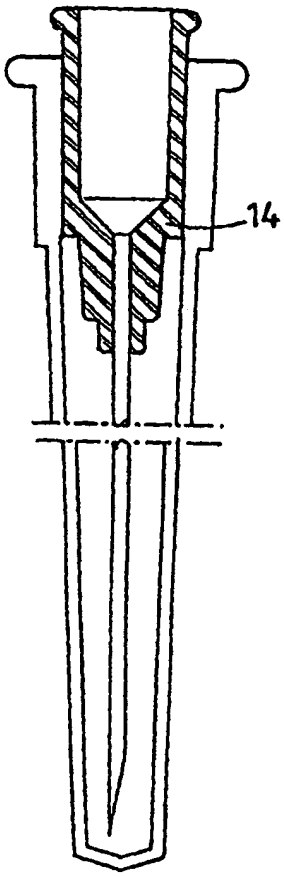



FIG. 2

FIG. 3

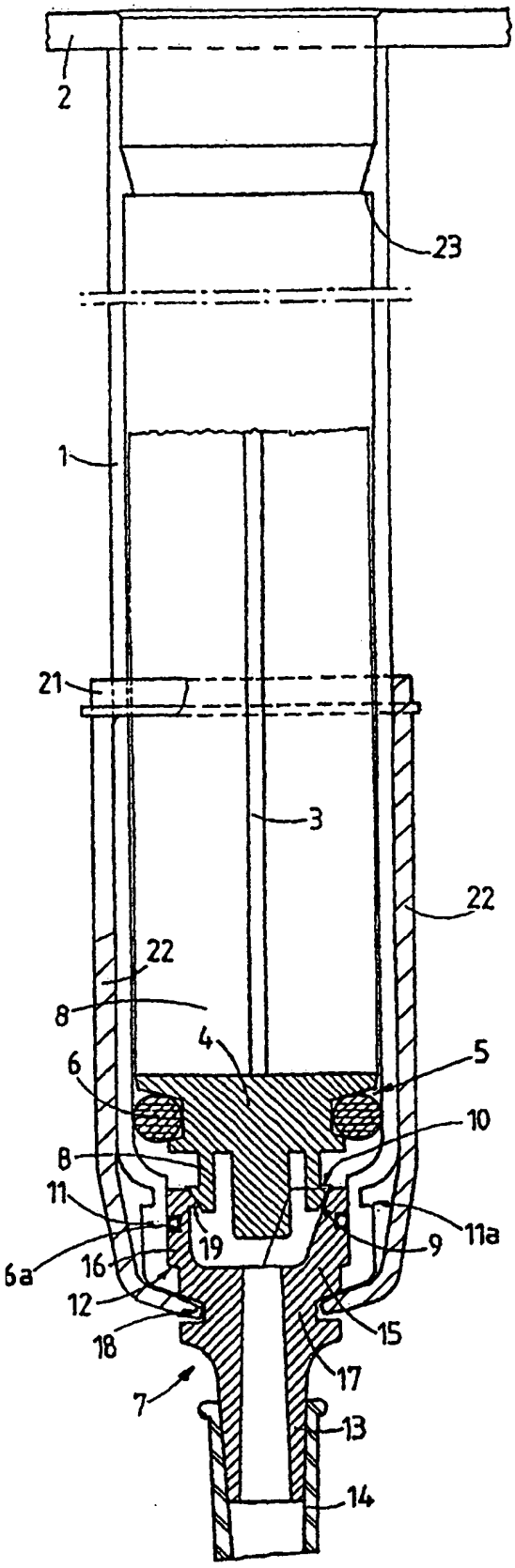
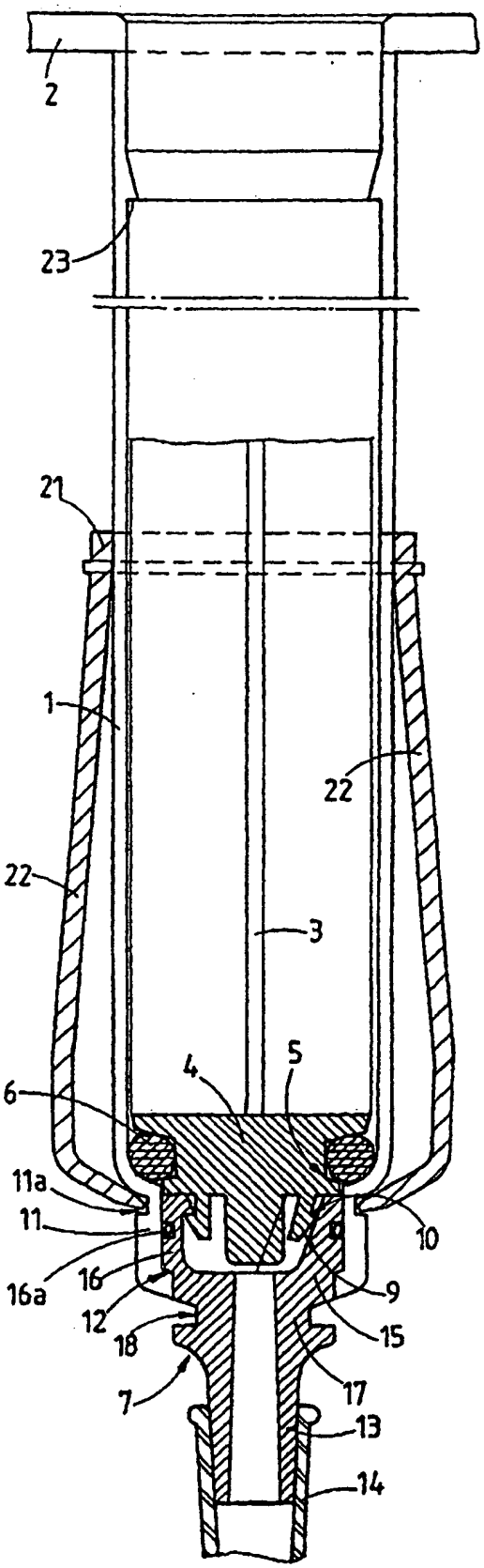

2
23
1
21
3
22
22
8
4
5
6
10
8
11
11a
19
9
6a
16
12
18
15
17
7
13
14

FIG. 4


2
23
21
1
22
22
3
4
5
6
11a
11
10
16a
16
9
12
18
15
7
17
13
14

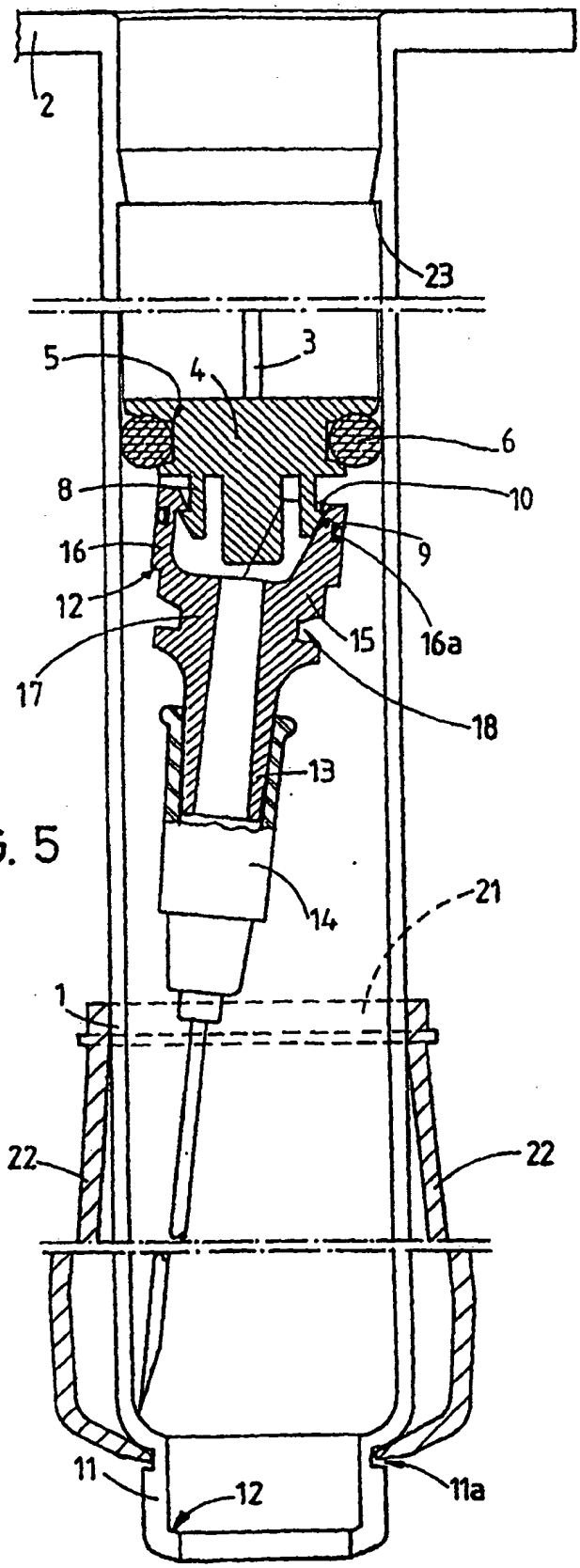

2
23
5
4
3
6
8
10
16
9
12
16a
15
17
18
13
14
21
1
22
22
11
12
11a

FIG. 5

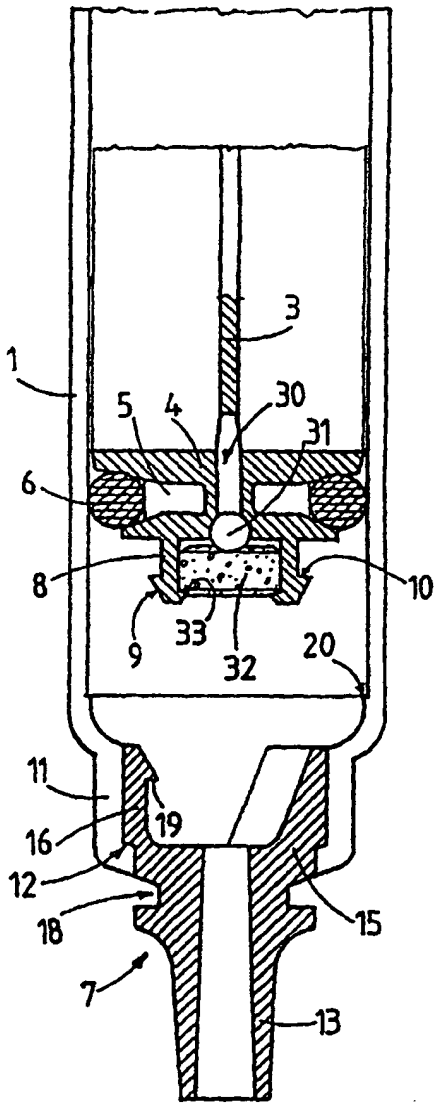

1
3
5
4
30
31
6
8
10
9
33
32
20
11
19
16
12
18
15
7
13

FIG. 6